



mobileGT™

Standard Development Platform

User's Manual MPC823e Based System



Table of Contents

1	OVERVIEW	1
2	MOBILEGT SDP CONTENTS	2
3	HOST REQUIREMENTS	3
3.1	Hardware Requirements	3
3.2	Software Requirements	3
4	CONNECTING HARDWARE COMPONENTS.	4
4.1	Power Supply	4
4.2	Serial Connectors	5
4.3	Audio Connections	6
4.4	Ethernet Connections	6
5	INSTALLING THE SOFTWARE COMPONENTS	7
5.1	Installing Software Packages	7
5.2	mobileGT Quick Start CD	7
6	HOST CONFIGURATION	8
6.1	Terminal Emulator	8
6.2	Host Networking	8
6.3	TFTP	9
6.4	Sharing Directories	9
7	TARGET CONFIGURATION	10
7.1	PlanetCore Loader	10
7.2	Self-Configuring the Installed Neutrino Image	11
8	THE NETWORKED DEVELOPMENT SYSTEM	13
8.1	Creating a CodeWarrior Project	13

8.2	Compiling and Running Applications for Neutrino	13
8.3	Connecting to the Target through Telnet and FTP	14
9	ALTERNATIVE BUILD IMAGES	15
9.1	Images for each Basic Target Configuration	15
9.2	Reflashing the Image	16
10	TRAINING	18
11	SUPPORT	19
12	CUSTOM ENGINEERING & PROFESSIONAL SERVICES	20
13	TROUBLESHOOTING	21
14	GLOSSARY	22
15	REFERENCES	23
15.1	Publications	23
15.2	Websites	24

1 Overview

As leader of the mobileGT™ alliance, Motorola is pleased to announce the first Standard Development Platform (SDP) for mobileGT. This complete development system includes a robust target hardware system designed around the highly integrated, automotive-qualified MPC823e PowerPC processor. It also includes a complete software development tool set for Microsoft Windows™-hosted development of Java and QNX C/C++ applications, using the popular CodeWarrior Integrated Development Environment (IDE).

Motorola, as part of their Driver Information Systems (DIS) business, has formed an alliance of best-of-breed companies to create the mobileGT architecture. This architecture is targeted for development of in-vehicle client systems in the automotive market. The expertise of the combined companies has led to an optimum balance of cost, quality, and time-to-market for both development efforts and production solutions. As the software investment grows, the new PowerPC processors and mobileGT platforms extend the automotive product developments.

QNX Software Systems Ltd. provides the software foundation for the system. The QNX RTOS (Real Time Operating System) combines a fault-tolerant architecture with a small memory footprint. Designed for dynamically upgradable mobile systems, the QNX RTOS allows new applications and drivers to be downloaded and started on the fly, no reboot or user-intervention required. This allows OEMs to maintain or upgrade systems' services long after the vehicle has been sold with minimal or no impact to the customer.

IBM's implementation of Java technology is supported with the IBM VisualAge Micro Edition tools, providing everything needed by embedded Java developers. The J9 Virtual Machine from Object Technologies International has real-time Java2 technology and supports multiple Java class libraries, including certain Java-compatible configurations. J9 is optimized to work with QNX at the thread level, delivering excellent performance for embedded applications. J9 also supports OSGi bundle management for dynamic downloads and runtime code replacement.

Metrowerks provides the popular CodeWarrior IDE, which speeds development time by creating, compiling, linking, assembling, and debugging within an integrated development environment. The project manager and build system enable the creation of solid code and shorten the compile/edit/debug cycles. The tightly integrated CodeWarrior development environment with its intuitive GUI (Graphical User Interface) for embedded development enhances software productivity.

Embedded Planet designs and builds the target system hardware. The flexible hardware allows developers to configure the solutions to the optimum set of available Input/Output (I/O). The integrated TFT LCD display with touch screen is helpful for product developments requiring a graphics Human Machine Interface (HMI.) The RPX bus interface provides for custom hardware solutions to be quickly added to the standard Micro Processing Unit (MPU) board, which reduces cost and cycle time for prototyping custom solutions.

The MPC823e PowerPC processor provides an automotive-qualified, high-performance 32-bit MPU with highly integrated I/O. The dual MPU core architecture allows the main processor to be free from management of the integrated I/O. The integrated I/O allows for lower system production costs and flexibility in product designs using a common platform approach. The integrated LCD/Video controller is cost efficient for products requiring a display.

Motorola, in partnership with Metrowerks, provides complete technical support for development. From startup to custom engineering, embedded development experts are available for questions. A variety of training programs are available. Customized training, custom design, software development, and consulting services can also be provided.

2 mobileGT SDP Contents

The mobileGT SDP contains the following components:

- mobileGT target system
- Quick Start Guide
- mobileGT Software Development Kit
 - Motorola mobileGT Quick Start CD 1.0
 - CodeWarrior for QNX Neutrino 2.1
 - QNX6 Cross Development Kit, Windows Host
 - IBM VisualAge Micro Edition 1.4
 - Java Applications Companion CD
- A serial cable with RJ45 connectors
- A RJ45 to 9 pin serial adapter
- Ethernet Cable
- Ribbon cable/RS232 adapters
- Power Supply (non-European shipments)

3 Host Requirements

The host system needs to meet the following standards:

3.1 Hardware Requirements

Pentium or higher compatible processor

128MB of RAM

Hard disk space: 50Mb CodeWarrior + 200Mb for QNX + 85-458Mb for VisualAge + 10Mb for Motorola mobileGT Quick Start

3.2 Software Requirements

Microsoft(TM) Windows (98, NT 4.0 with service pack 5, or 2000)

Adobe Acrobat Reader 4.0 or higher for viewing documentation.

Terminal emulator configured as described in section 6.1. HyperTerminal, which comes with Microsoft Windows, will suffice if another is not available.

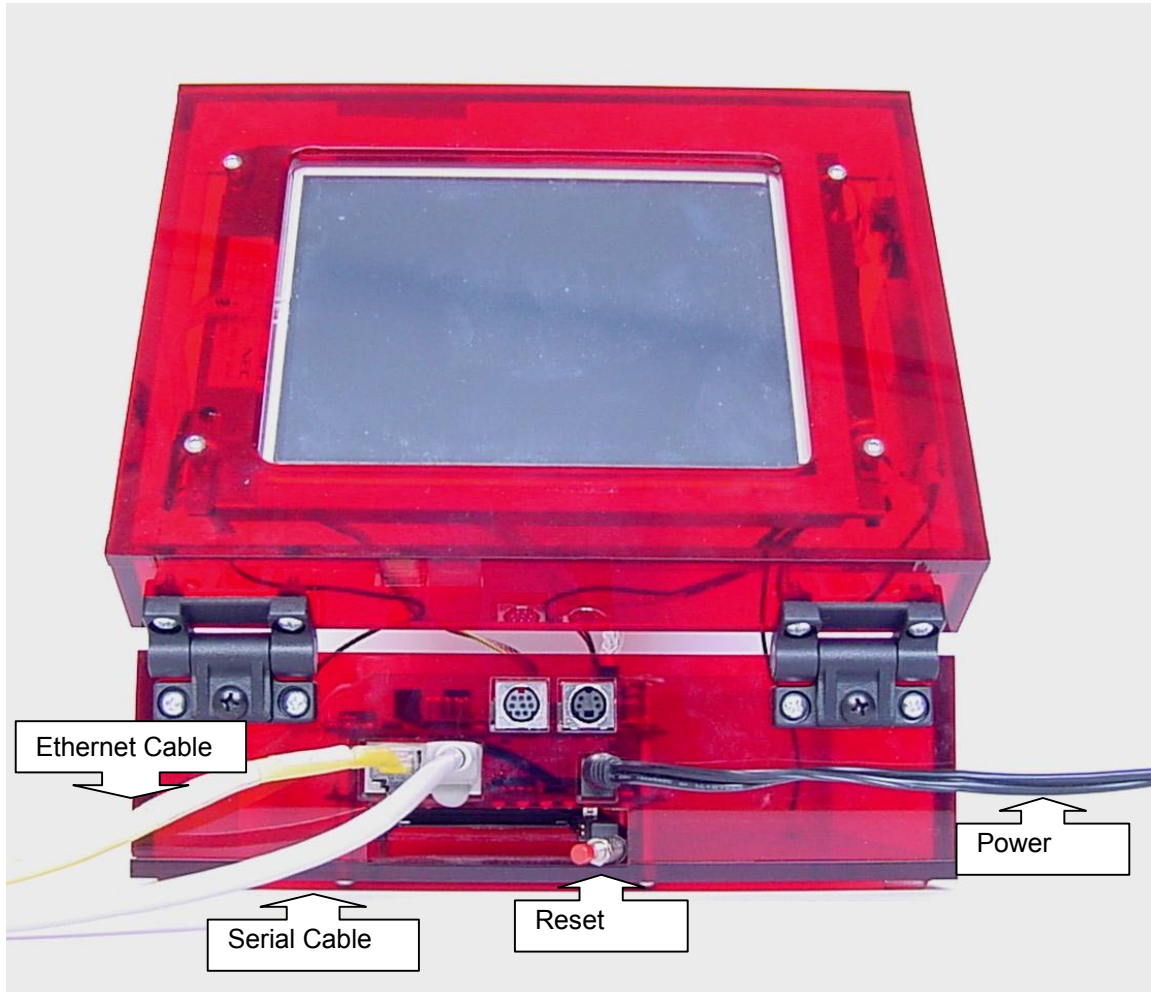
TCP/IP communications protocol configured as described in section 6.2.

TFTP (Trivial File Transfer Protocol) utility configured as described in section 6.3.

4 Connecting Hardware Components.

The mobileGT development system was constructed to make it easy to connect and get running as fast as possible. Simply supply the power and hook up serial and Ethernet cables. Refer to Figure 1 regarding component connections.

Figure 1 Hardware Components



4.1 Power Supply

The power supply (not included in European shipments) provides 5VDC at 2.8A to power all the hardware contained within the mobileGT target system, including the RPX Lite™ board, *H* Expansion Card, LCD, LCD back light, and touch screen. The input for the power supply ranges from 100-240VAC, 50-60Hz, so it should work equally well in Japan, North America, and Europe, provided that the proper physical connectors (not included) are used.

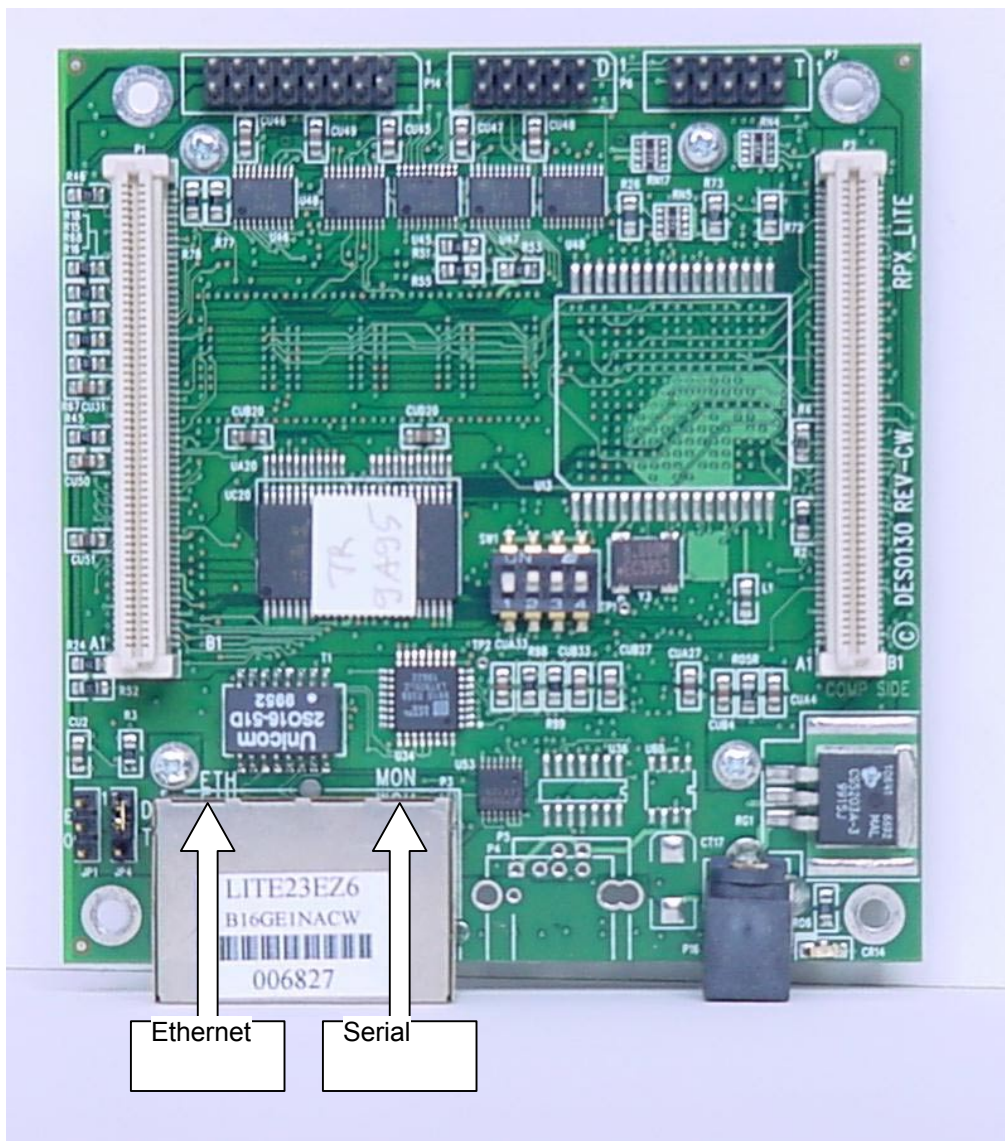
The power supply connects to the RPX Lite board on the front of the board (accessible at a through-hole in the mobileGT target system) at physical connector *P16* (See Figure 1).

4.2 Serial Connectors

Up to four serial ports (SMC1, SMC2, SCC2, and SCC3) can be accessed on the mobileGT target system at any one time. The SMC1 must be accessed on the RPX Lite board via an adapter that physically connects the RJ-45 port on the RPX Lite to a standard serial DB9 port. The three remaining serial ports are accessed on the surface of the HIOX Expansion Card via included cables that physically adapt the 10-pin computer board header to a standard serial DB9 port. For most host computers, a null modem is not necessary and should not be used. If connecting the mobileGT target system to another device, a null modem may be necessary, depending on the pinout of the device. Consult the device's relevant documentation for configuration information.

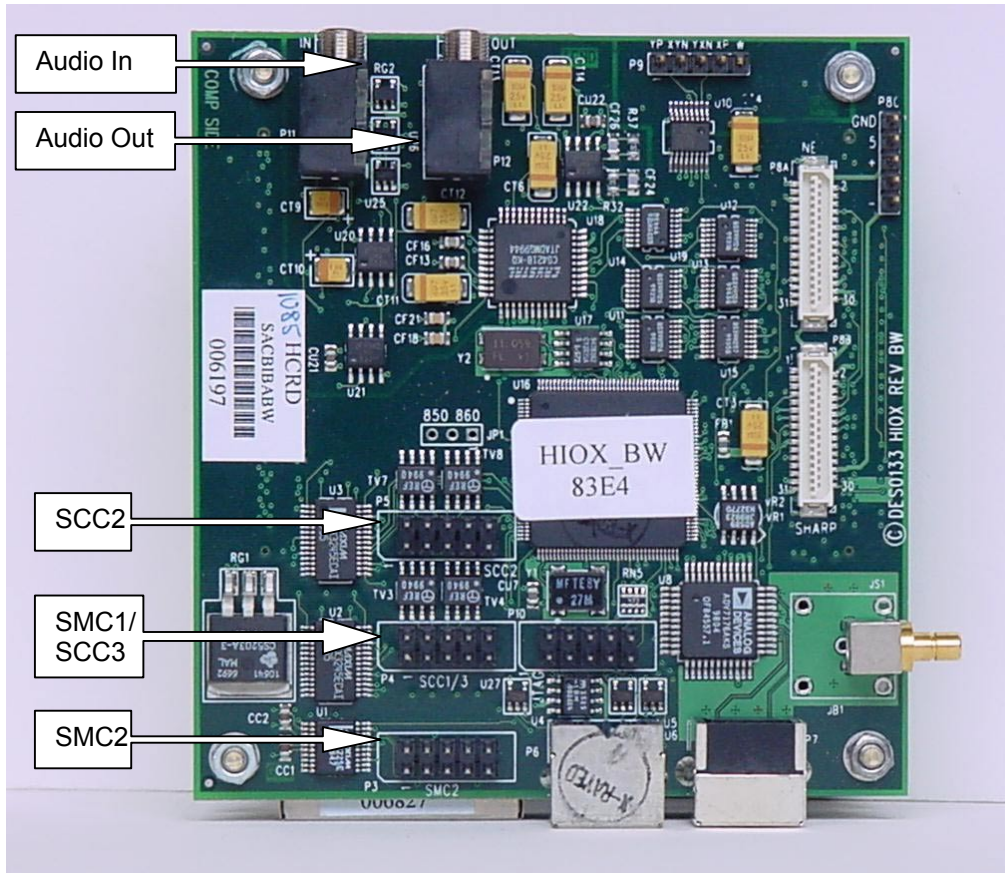
The mobileGT target system contains two RJ-45 port connectors on the front. The SMC1 cable connects to the connector on the right. It is silk-screened *MON*. See Figure 2.

Figure 2 SMC1



The other serial connections are made into the HIOX Expansion Card inside the mobileGT target system. See Figure 3. The ribbon cables can be pulled out of the box for convenience. Be sure that pin 1 of each header, labeled on the HIOX Expansion Card, is properly oriented, so that it corresponds to pin 1 of the connector, marked by the red wire of the ribbon cable.

Figure 3 HIOX Card



4.3 Audio Connections

The HIOX board will support a stereo line in or microphone input. It will also support stereo line out or a speaker output. See Figure 3.

4.4 Ethernet Connections

An Ethernet cable is not provided with the mobileGT SDP. A standard 10-pin RJ-45 Ethernet cable will suffice. The Ethernet cable connects to the RPX Lite board on the front of the board (accessible at a through-hole in the mobileGT target system) on the left side of physical connector P3 silk-screened *ETH*.

5 Installing the Software Components

The mobileGT SDP software tools are made up of software packages from the members of the mobileGT alliance. Included are mobileGT Quick Start software from Motorola, CodeWarrior for QNX, Neutrino Embedded Systems from Metrowerks, the QNX6 Cross Development Kit for Windows from QSSL, and the VisualAge Micro Edition tools from OTI.

5.1 Installing Software Packages

There are five software installations to complete to use mobileGT. They should be installed in the following order:

- QNX6.1 Windows SDK Patch A for mobileGT
- Metrowerks CodeWarrior
- mobileGT Quick Start
- VisualAge Micro Edition 1.4
- Java applications Quick Start

5.2 mobileGT Quick Start CD

The mobileGT Quick Start CD contains several example build images, tools, and documentation. To install it, simply run the setup utility and provide any preferences when prompted. The utility will perform the following tasks:

- Copy example image and build files to the hard disk
- Copy specific utilities to the hard disk
- Create an environment variable, MOBILEGT_ROOT, identifying the location of the installation
- Copy the Embedded Planet PlanetCore™ utilities and documentation to the hard disk

6 Host Configuration

The mobileGT Quick Start software provides a development environment for embedded systems. It provides a fully networked system between the host and the target. Using the networking capabilities of both the target and the host, images can be easily downloaded and burned into flash memory. A networked configuration is described in Chapter 8 that allows the compilation of the application on the host and the ability to run it on the target as it would be run on a desktop system.

Three components on the host have to be configured: a terminal emulator, network environment, and TFTP server.

6.1 Terminal Emulator

A terminal emulator is necessary to communicate with the target. Terminal emulator software, called Hyperterminal, is distributed with Windows. However, any good terminal emulator should work well.

To connect to the mobileGT target system, the terminal emulator must be set up as follows:

9600 baud with 8 data bits

No parity

1 stop bit

No flow control

Once connected to the mobileGT target system, the baud rate may be changed using the PlanetCore utilities. Be sure the baud rate of the terminal emulator is correct. Also, be aware that it is possible to set the baud rate of the terminal for the Neutrino terminal and the baud rate for PlanetCore to different values.

6.2 Host Networking

Both the PlanetCore utilities and the Neutrino RTOS support TCP/IP networking across the mobileGT target system's Ethernet port. The PlanetCore utility uses a relatively simple TCP/IP stack, so that it can download files using TFTP. Neutrino's TCP/IP stack is more sophisticated and supports a wide range of services. The PlanetCore utility and Neutrino do not run simultaneously, so they can be configured separately. However, both PlanetCore and Neutrino can be configured to talk to the host computer. This section explains how to configure the host machine to talk with the mobileGT software, both PlanetCore and Neutrino.

The PlanetCore utility supports enough of the TCP/IP protocols to TFTP files, but it doesn't support some of the more sophisticated protocols, such as domain name services (DNS) or dynamic host configuration protocol (DHCP.) Many corporate networks are set up using DHCP. If the host is configured using DHCP, change it to use a static IP address. Consult your local system administrator to avoid address conflicts. It is necessary to know the IP address in order to configure the target. For additional information on this topic refer to section 7.1.

6.3 TFTP

The PlanetCore utilities use TFTP to transfer images from the host to the mobileGT target system. The PlanetCore utility needs to talk to a driver on the host machine in order to obtain the files. Several such drivers are available. One is a suite of networking utilities, including a TFTP daemon called *Exceed*, that Hummingbird Communications Ltd. Copyright © sells. There are also shareware utilities available.

Configure the TFTP utility to allow read access to a directory. Refer to the documentation that comes with the TFTP utility for details. TFTP daemons typically establish a directory in which they will look for files. When ready to download a file, copy it to this directory only, and command the PlanetCore utility to retrieve it.

6.4 Sharing Directories

Neutrino can mount directories on the host machine. During development, this can be a tremendous help. It allows execution of applications on the mobileGT target system without having to download them into flash. It allows access to all the utilities in the QNX6 Cross Development Kit, Windows Host. The networked development image supplied on the mobileGT will execute a netconfig application when it is first run. The netconfig application will create a netstart script and will offer the opportunity to mount directories on other systems. To do this you will need the following information about the Windows host:

The name of the Windows host

The IP address of the windows host

The name of the shared directory to be mounted

The name of the directory as it will appear on the mobileGT system.

In order to mount other directories from the mobileGT target system, share them from the host. To share the directories, do the following:

Open the Windows Explorer®.

Select the directory that is to be shared.

Choose **File→Properties** from the Windows Explorer menu.

Choose the **Sharing** tab in the Properties dialog.

Choose **Share As** and type in the name for the directory.

Select the **Apply** button.

The share names of the directories are needed when the target is configured.

7 Target Configuration

Two components to the software are loaded on the mobileGT target system when it is shipped: the PlanetCore utility and Neutrino images. These are similar to the BIOS and Windows on the host machine. The PlanetCore utility should be left on the mobileGT target system, but the Neutrino images may be replaced. The Neutrino image that is shipped should be a good starting point. Eventually, a new Neutrino configuration may be necessary. Changes may be made regarding a set of drivers or baud rate, but once the image is changed, it is necessary to reload the new image into flash.

7.1 PlanetCore Loader

The PlanetCore loader communicates to the host through a serial connection. To access it, start the terminal emulator and reboot the mobileGT target system. If it is correctly configured, the PlanetCore startup banner displays as shown in Figure 4. If the startup banner does not show up, check the connections and refer to section 6.1 for directions on how to configure the terminal emulator. If the PlanetCore startup banner does appear, press the **ESC** key within two seconds. The message *Autoboot Aborted* and the PlanetCore loader prompt should appear.

Figure 4 PlanetCore Startup Banner

```
PlanetCore Boot Loader v1.02
Copyright 2000 Embedded Planet. All rights reserved.

Autoboot in 2 seconds.
ESC to abort, SPACE or ENTER to go.
Autoboot Aborted.
>
```

The PlanetCore loader maintains a number of settings in flash. These are easily visible by typing *SET* at the PlanetCore prompt. See Figure 5. The settings control the IP address that the PlanetCore loader uses, which host IP address it will communicate with, and how it will boot up Neutrino. Figure 5 shows the default settings for a mobileGT target system.

Change the IP and TARGET addresses in order to download the images to the mobileGT target system. The IP address refers to the address of the mobileGT target system. The TARGET address refers to the IP address of the Windows machine. Make sure that the addresses correspond to those identified when the host machine was configured. See section 6.2.

In order to set the IP and TARGET addresses, use the *SET* command:

```
>SET IP 222.222.222.222
IP equals 222.222.222.222.
>SET TARGET 222.222.222.221
Target equals 222.222.222.221.
>STORE
>
```

The “STORE” command saves the current PlanetCore settings into flash. They will be retained even after a reboot.

If the PlanetCore settings on the mobileGT target system match those in Figure 5, no further modifications need to be made. If not, use the *SET* command as described above to change the settings. If uncertain of the acceptable values, simply type *SET <fieldname>*. The PlanetCore loader prompt will display which values may be used. Use the *HELP* command to learn about other commands in the PlanetCore loader.

Figure 5 PlanetCore Settings

```
>set
Baud                      = 9600
Multiplier (Clock multiplier) = 8
Board                     = RPXL
Revision                  = CW
Processor                  = 823
Variant                   = E
DRam      (MBytes on board dram) = 16
Cols      (On board dram columns) = 10
NVRam     (KBytes on board NV Ram) = 32
Sttm      (Degrees C*10)          = 131
Twirl                      = N
ICache                     = Y
SYPCR                      = FFFF0689
RAMtest                    = N
RestoreCE (Cannot go to ram if set) = N
SerOut    (Serial output of loader) = Always
RS232     (Enable rs232 drivers)   = Y
IP         = 100.0.0.2
Target     = 100.0.0.1
File       = dev.loadme
ENET       = 0010EC001439
DefaultENET = ENET
TftpRAM    = High
Start      = FF000210
Format     = Flash
Autoboot   = Confirm
>
```

Refer to the PlanetCore Boot Loader User's Manual from Embedded Planet for more detailed information on the PlanetCore loader.

7.2 Self-Configuring the Installed Neutrino Image

The mobileGT Quick Start Kit comes with a self-configuring image that enables application development for mobileGT to begin immediately. The first time the mobileGT target system boots, the image executes a *netconfig* application that creates a script to start the network drivers. The *netconfig* application prompts for the IP address of your mobileGT target system and other network configuration information. It then creates a script that runs every time the system boots up. Thereafter, every time the mobileGT target system boots, it automatically starts the network drivers and attempts to mount any specified directories. The recommended directories are those mentioned in section 6.4. If directories are mounted, any Neutrino applications for PowerPC processors that reside in the subdirectories of those mounted directories can be executed on the mobileGT target system.

A sample execution of the *netconfig* application is shown in Figure 6. "*netconfig*" may be run several times, if necessary, to change the network configuration.

Figure 6 Running netconfig

```
# netconfig
Welcome to the mobileGT 823e Platform

    [1] Create netstart script
    [2] Remove netstart script
    [3] Quit

Please enter choice: 1
Creating netstart script
Please enter a name for the mobileGT development system: MGTdevsys
Please enter the IP address the mobileGT development system: 100.0.0.1
Please enter the gateway address: 100.0.0.254
Please enter the network mask: 255.255.255.0
Please enter the NFS server IP address: 100.0.0.5
Will you be mounting to a UNIX or QNX host (Y/N)? y
Please enter the host machine name: QNXhost
Please enter the NFS host IP address: 100.0.0.4
Please enter the absolute host directory: /home/mgt
Please enter the local absolute directory: /qnx/mgt
Will you be mounting to a UNIX or QNX host (Y/N)? n
Will you be mounting to a WindowsNT host(Y/N)? y
Please enter the host NT machine name: NThost
Please enter the NT host IP address: 100.0.0.3
Please enter the absolute host directory: /mgt
Please enter the local absolute directory: /nt/mgt
```

8 The Networked Development System

The networked development system links the mobileGT target system with the host computer. It provides the ability to compile applications on the host and to immediately debug them on the target. The image running on the target can establish a TCP/IP connection to the host, allowing it to mount directories on the host and run a debug interface to the CodeWarrior development environment.

8.1 Creating a CodeWarrior Project

CodeWarrior for QNX provides project templates designed to work with Neutrino. Creating a CodeWarrior project using the QNX project template provides the correct configuration options to build applications quickly and debug them easily.

By default, the '%MOBILEGT_ROOT%/home' directory is mounted as '/mgt' by the networked development image. If a subdirectory of this directory is used as a base for the CodeWarrior project, the application can be run on the target by using the full path.

To create a new CodeWarrior Project, do the following:

Launch CodeWarrior.

Select **File**→**New**. The *New* dialog will pop up.

Choose the **Project** tab.

Select QNX Neutrino PPC Stationary.

Type in a pertinent project name.

Select the Location of the root of the project, e.g. "c:/Program Files/mobileGT/home."

Click the **OK** button, and CodeWarrior creates a project with the given specifications.

Once the project has been created, it needs to be customized. Specifically, the debug interface uses TCP/IP, and the project needs to be told where to gain access to processes running on the mobileGT target system. To change the debug interface, do the following:

Choose **Edit**→**C++ debug Settings...**

In the *Target Settings Panels* of the *C++ debug Settings* dialog, select the **Connection Settings** under the **Debugger** tree.

In the *View Connection Type* dropdown list, select **View TCP/IP Settings**.

In the *Host Name* text box, type in the IP address of the mobileGT target system followed by **:10000**, e.g., **222.222.222.222:10000**.

Select the **OK** button.

The debugger should now be able to communicate with the pdebug driver running on the mobileGT target system.

8.2 Compiling and Running Applications for Neutrino

CodeWarrior provides an integrated development environment for compiling and debugging applications on the target. For details on using CodeWarrior, please refer to the CodeWarrior IDE User Guide and the CodeWarrior Targeting QNX Neutrino guide.

8.3 Connecting to the Target through Telnet and FTP

The Networked Development System supports both Telnet and FTP. In fact, a Telnet interface may be used instead of the serial shell. Both incoming and outgoing connections may be made. Initially, only the root login with a blank password may be used. New accounts may be added using the “passwd” command from a Neutrino shell.

9 Alternative Build Images

The mobileGT Quick Start Kit provides a number of build files and images for the mobileGT target system. The build files are intended to provide examples for configuring Neutrino for the mobileGT target system. Various combinations of hardware are enabled through the drivers in the build images.

9.1 Images for each Basic Target Configuration

The mobileGT Quick Start Kit provides support for six build images. Each image starts a set of hardware drivers that enable features of the mobileGT target system. Thirteen features are addressed in the build images, but all thirteen of them are not possible in the same configuration. For instance, the audio drive uses the same pins on the MPC823e as the serial driver does on SMC2. Also, the touchscreen uses the same pins as the serial on SCC3. Table 1, indicates the features available on each of the six build images.

Table 1 Build File Configurations

ID	SCC2	SCC3	SMC1	SMC2	H/W Features	Build File Name	Corresponding HIOX Configuration
A	RS232 (handshake) (HIOX)	RS232 (handshake), SCC3 CD signal available	RS232 (no handshake) (CPU enabled, HIOX disabled)	RS232 (no handshake)	LCD, no TOUCH, no Audio	config_a.build	1
B	RS232 (handshake) (HIOX)	not available since touchscreen enabled	RS232 (no handshake) (CPU enabled, HIOX disabled)	not available since audio enabled	LCD, TOUCH, Audio	config_b.build	4
C	RS232 (handshake) (HIOX)	not available since touchscreen enabled	RS232 (no handshake) (CPU enabled, HIOX disabled)	RS232 (no handshake)	LCD, TOUCH, no Audio	config_c.build	5
D	Ethernet (CPU)	RS232 (handshake), SCC3 CD signal available	RS232 (no handshake) (CPU enabled, HIOX disabled)	RS232 (no handshake)	LCD, no TOUCH, no Audio	config_d.build	1
E	Ethernet (CPU)	not available since touchscreen enabled	RS232 (no handshake) (CPU enabled, HIOX disabled)	not available since audio enabled	LCD, TOUCH, Audio	config_e.build	4
F	Ethernet (CPU)	not available since touchscreen enabled	RS232 (no handshake) (CPU enabled, HIOX disabled)	RS232 (no handshake)	LCD, TOUCH, no Audio	config_f.build	5

To determine which image is most suitable to use, do the following:

Review the features listed in columns two through six.

Identify the correct build file ID in the first column.

The corresponding build file is listed in the *Build File Name* column.

The above configurations correspond to various configurations listed in the HIOX user's manual. The last column of Table 1 traces the build configurations here to hardware configurations in the HIOX User's Manual.

After choosing the appropriate configuration, it needs to be downloaded. A downloadable image for each configuration is provided with the installation. However, at some point, the image will need to be customized. Then it needs to be rebuilt. There is a makefile provided with each build file for this purpose. The build files create an image ready to download. To build all of the images,

type *make* at a command line prompt. To build a specific image, supply the makefile the target name for that image, for instance, “make config_a.”

The makefiles also have a target, *clean*, to remove the images. Type *make clean* to remove the images and all the intermediate files.

The build utilities produce downloadable S-record files with *a.loadme* extensions, e.g., *config_a.loadme*. See section 9.2 for instructions on downloading and flashing the images.

9.2 Reflashing the Image

The PlanetCore loader provides a utility, TFTP, for downloading files across the Ethernet. See section 6.3 for instructions on configuring TFTP on the host and section 7.1 on configuring the TFTP portion of PlanetCore on the mobileGT target system.

Once TFTP is configured on both the target and the host, the images may be downloaded to the mobileGT target system, using the following example procedure:

Copy the file to be downloaded to the TFTP directory on the host.

Establish a connection to the mobileGT target system through a terminal emulator.

Reboot the mobileGT target system.

Immediately press the **ESC** key to enter the PlanetCore utility.

At the PlanetCore loader prompt, type *run <filename>*.

The file will be downloaded to the mobileGT target system and executed. The image has a flash burner attached to it that erases the flash and programs the image into the correct memory addresses.

Figure 7 Downloading and Flashing an Image

```
PlanetCore Boot Loader v1.02
Copyright 2000 Embedded Planet. All rights reserved.

Autoboot in 2 seconds.
ESC to abort, SPACE or ENTER to go.
Autoboot aborted.
>run config_a.loadme

PlanetCore Flash Burner v1.03
Copyright 2000 Embedded Planet. All rights reserved.

Start = 0x00120000, target = 0xFF008000, length = 0x000C0608

Erasing, programming and verifying will start in 7 seconds
Press P to start immediately or ESC to cancel
Press Space or Enter for more options.
.....

Erasing
```

10 Training

Each of the companies in the mobileGT alliance has standard training courses that allow engineering teams to develop expertise in a focused plan. This allows training efforts to be put where they are needed most. These include a variety of courses in QNX, IBM VisualAge Micro Edition, CodeWarrior, and PowerPC processor. Contact a mobileGT sales representative for information and quotes.

Following is a list of contacts for the recommended standard training courses:

QNX by QSSL,
Training by QSSL

<http://www.qnx.com/support/training/index.html>

J9 VM and VisualAge Micro Edition by OTI and IBM,
Training by Object People

<http://www-4.ibm.com/software/ad/certify/vaproducts.html>

CodeWarrior by Metrowerks,
Training by Metrowerks

<http://www.CodeWarrior.com/training/>

PowerPC processor from Motorola
Training by Arnewsh, Inc.

<http://www.arnewsh.com/training.html>

11 Support

Besides exploring the mobileGT web sites and training on the system, support is also available. An experienced, embedded-development team is on call to furnish quick answers to both simple and complex questions to keep the project moving and the delivery on schedule.

When the initial support expires, extend the support for as long as necessary. This allows the flexibility to purchase support for small projects or large. The support is available regionally, as well, for the appropriate support response. Contact Metrowerks for more information and pricing.

12 Custom Engineering & Professional Services

Expert consultants are ready to help evaluate requirements, recommend solutions, and provide design services. Custom-tailored training programs are available to meet specific needs. Cross-company experts can offer solutions. Embedded systems developers can provide custom hardware and/or software development. Use these services as much, or little, as needed. Contact your Motorola sales office for custom engineering services.

13 Troubleshooting

Problem	Possible Solutions
Cannot access the PlanetCore utility across the serial connection.	<p>Check the physical connections. See section 4.2.</p> <p>Check the serial configuration. See section 6.1.</p> <p>Reboot while repeatedly hitting the ESC key.</p> <p>Try different baud rates.</p> <p>It is possible to turn off the serial output from the PlanetCore utilities. To recover, try resetting the PlanetCore from the EEPROM. Refer to Embedded Planet's manuals for directions.</p>
Cannot download files to the host from the mobileGT target system.	<p>Make sure the IP addresses listed in the Target and IP settings of the PlanetCore utility are correct. See section 7.1.</p> <p>Make sure the TFTP utility is configured. See section 6.3.</p> <p>Make sure the file that is downloading is in the TFTP directory on the host.</p>
Cannot access the flasher utility.	<p>Make sure %MOBILEGT_ROOT%/bin is in the PATH environment variable.</p>
Neutrino image will not boot.	<p>Make sure the Neutrino image and PlanetCore utility are talking at the same baud rate.</p> <p>Make sure the IPL and signature files are in place. These files reside in sector 0xFF000000 of the mobileGT target system.</p> <p>Make sure that none of the images overlap in the address space.</p>

14 Glossary

Table 2 Glossary

QNX 6.1	QNX 6.1 is a product from QNX Software Systems Ltd. It includes the Neutrino RTOS and the Photon GUI. The mobileGT Standard Development Platform ships with the QNX6.1 Cross Development Kit, Windows Host.
J9	J9 is a Java Virtual Machine from Object Technologies International. It is distributed as part of VisualAge. Versions are available that run on Neutrino and Microsoft Windows.
VisualAge	VisualAge is a multiplatform Java development environment that runs on the Microsoft Windows host. It provides the cross development Java tools to build and debug applications for both Windows and Neutrino.
CodeWarrior	CodeWarrior is an integrated development environment that runs on the Microsoft Windows host. It provides project management and debugging tools for doing cross development for the Neutrino target.
mobileGT target system	The mobileGT target system is a PowerPC development system built by Embedded Planet. It consists of a RPX Lite board, IOX card, LCD, and touch screen. It is packaged in a red acrylic box and shipped with a Networked Development System already installed.
RPX Lite	The RPX Lite is a board on the mobileGT target system that includes a MCP823e PowerPC processor, 16 Mb of FLASH, 16Mb of RAM, a serial interface, Ethernet interface, and PCMCIA connector.
SDP	SDP is the acronym for Standard Development Platform.
Networked Development System	Networked Development System refers to a particular Neutrino image that is shipped with the mobileGT SDP. This image allows users to configure it to their environment, as well as begin writing applications and debugging immediately.
HIOX	The HIOX card is an I/O interface card supplied with the mobileGT target system. It has interfaces to additional serial connections, LCD, touch screen, and audio.
QSSL	QSSL is the acronym for QNX Software Systems Ltd.
OTI	OTI is the acronym for Object Technologies International.
Neutrino	Neutrino is the Real Time Operating System from QNX Software Systems shipped with mobileGT. Neutrino is a component of QNX 6.1.
RTOS	RTOS is the acronym for Real Time Operating System.
MPU	MPU is the acronym for a Micro Processor Unit.
HMI	HMI is the acronym for Human Machine Interface. This differs from a GUI in that it can incorporate non-graphical aspects of an interface such as speech or sensory data.
GUI	GUI is the acronym for Graphical User Interface.
Photon	Photon is a microGUI from QNX Software Systems shipped with mobileGT. Photon is a component of QNX 6.1.0.
Build file	A build file is a file describing how the image should be built. It is used in conjunction with the QNX utilities mkifs and mkefs. It lists the drivers and directories needed by the image and can contain scripts used by the image.
Image	An image is a file that contains a file system partition for Neutrino. It may contain the kernel or a file system to be mounted.

15 References

15.1 Publications

The following publications are provided with the Installations.

Motorola

- mobileGT MPC823e Standard Development Platform User's Manual
- mobileGT Quick Start Guide
- PowerPC MPC823e User's Manual

Metrowerks' CodeWarrior

- CodeWarrior IDE User's Guide
- CodeWarrior Porting Guide
- CodeWarrior Scripting Reference
- CodeWarrior Targeting QNX Neutrino

IBM/OTI's VisualAge Micro Edition

- VisualAge Micro Edition 1.4 Quick Start Tutorials
- VisualAge Micro Edition 1.4 Reference Manual

Embedded Planet

- RPX Lite CW Getting Started
- RPX Lite CW User Manual
- RPX Lite CW Programming Manual
- HIOX BW User Manual
- HIOX BW Programming Manual
- PlanetCore Version 1.2 Overview User Manual
- PlanetCore Version 1.2 Boot Loader User Manual
- PlanetCore Version 1.2 Flash Burner User Manual
- PlanetCore Version 1.2 Diagnostic and Utilities (Release 1) User Manual
- PlanetCore Version 1.2 Diagnostic and Utilities (Release 1) User Manual

QNX Software Systems

- QNX SDK for Windows Help
- QNX Photon Help

15.2 Websites

Motorola Corporate

<http://www.mot.com/home/index.html>

Motorola Semiconductor Products Sector

<http://e-www.motorola.com/>

Motorola mobileGT Page

<http://e-www.motorola.com/automotive/mobilegt/>

Metrowerks

<http://www.Metrowerks.com/>

OTI

<http://www.oti.com/>

IBM VisualAge Micro Edition

<http://www.embedded.oti.com/>

Embedded Planet

<http://www.embeddedplanet.com/>

QNX Software Systems

<http://www.qnx.com/>

QNX Developers Network

<http://www.qdn.com/>